



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re original application of:

Applicants : Mark C. Schmidt, et al.
Application Serial No.: 10/042,755
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Title: AUTOMATICALLY-ACTIVATED HAND-SUPPORTABLE
MULTI-MODE LASER SCANNING BAR CODE SYMBOL
READING SYSTEM
Examiner : n/a
Group Art Unit : 2876
Attorney Docket No. : 108-181USA000

Honorable Commissioner
of Patents and Trademarks
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Prior to examination of the above-referenced Patent Application, please amend the same as follows:

AMENDMENT TO THE CLAIMS:

Please cancel claims 31-109 and 115-119 without prejudice or disclaimer.

REQUIREMENT UNDER 37 C.F.R. 1.121

As required under 37 C.F.R. 1.121, a clean set of pending claims 1-30 and 110-114 is set forth below.

1. A bar code symbol reading device comprising:

(1) a hand-supportable housing having a light transmission aperture wherethrough visible light can exit and enter said hand-supportable housing;

(2) a laser scanning engine, disposed within said hand supportable housing, that selectively operates in one of first and second scanning modes,

wherein in said first scanning mode, the laser scanning engine projects an omni-directional scanning pattern through said light transmission aperture, detects and decodes bar code symbols on objects passing through said omni-directional scanning pattern, and produces symbol character data representative of decoded bar code symbols, and

wherein in said second scanning mode the laser scanning engine projects a single line scanning pattern through said light transmission aperture and detects and decodes bar code symbols on objects passing through said single line scanning pattern, and produces symbol character data representative of decoded bar code symbols,

(3) a manually-activated data transmission switch integrated with said hand-supportable housing, for producing a data transmission activation control signal in response to activation of the data transmission switch;

(4) a data transmission subsystem in said hand-supportable housing that operates under control of control circuitry to communicate the symbol character data produced by the laser scanning engine to a host device operably coupled to said bar code symbol reading device;

(5) said control circuitry enabling communication of symbol character data produced by the laser scanning engine in said second scanning mode of operation to said host device upon occurrence of a first set of predetermined conditions including receipt of said data transmission activation control signal produced by said data transmission switch, and said control circuitry disabling communication of symbol character data produced by the laser scanning engine in said second scanning mode of operation to said host device upon occurrence of a second set of

predetermined conditions including lack of receipt of said data transmission activation control signal produced by said data transmission switch.

2. The bar code symbol reading device of claim 1, wherein said control circuitry enables communication of symbol character data produced by the laser scanning engine in said first scanning mode of operation to said host device irrespective of said data transmission activation control signal produced by said data transmission switch.

3. The bar code symbol reading device of claim 1, further comprising a support stand that supports said hand-supportable housing, and mode selection means integrated with said hand-supportable housing, for selectively operating said laser scanning engine in one of said first and second scanning modes in response to placement of said hand-supportable housing in said support stand.

4. The bar code symbol reading device of claim 1, wherein said laser scanning engine comprises:

a bar code symbol presence detection means in said hand-supportable housing for processing scan data so as to detect the presence of said bar code symbol on said object and to automatically generate a first control signal in response to the detection of said bar code symbol; and

decode processing means in said hand-supportable housing for processing scan data so as to decode said bar code symbol on said object and for automatically producing symbol character data representative of said decoded bar code symbol, and automatically generating a second control signal indicative of the production of said symbol character data.

5. The bar code symbol reading device of claim 4, wherein said bar code symbol presence detection means detects said bar code symbol by detecting first and second envelope borders of said bar code symbol.

6. The bar code symbol reading device of claim 4, wherein said first set of predetermined conditions includes receipt of said second control signal and said data transmission activation

control signal within respective predetermined time periods, and said second set of predetermined conditions includes receipt of said second control signal and lack of receipt of said data transmission activation control signal within respective predetermined time periods.

7. The bar code symbol reading device of claim 4, wherein said laser scanning engine comprises object detection means in said hand-supportable housing, for detecting said object in at least a portion of an object detection field defined relative to said housing and automatically generating a third control signal indicative of the detection of said object in at least a portion of said object detection field.

8. The bar code symbol reading device of claim 7, further comprising control circuitry that selectively activates said bar code symbol presence detection means and said decode processing means in response to occurrence of said third control signal.

9. The bar code symbol reading device of claim 7, wherein said object detection means comprises:

- a signal transmitting means for transmitting a signal towards said object in said object detection field, and

- a signal receiving means for receiving said transmitted signal reflected off said object in at least a portion of said object detection field, and automatically generating said third control signal indicative of the detection of said object in at least a portion of said object detection field.

10. The bar code symbol reading device of claim 9, wherein said signal transmitting means comprises an infra-red light source for transmitting a pulsed infra-red light signal, and wherein said signal receiving means comprises an infra-red light detector disposed in said hand-supportable housing.

11. The bar code symbol reading device of claim 9, wherein said signal transmitting means comprises a laser diode for transmitting a pulsed laser signal, and wherein said signal receiving means comprises a photodetector disposed in said hand-supportable housing.

12. The bar code symbol reading device of claim 1, wherein said laser scanning engine comprises a visible laser light source, a scanning element and at least one stationary mirror that cooperate to project said single line scanning pattern through said light transmission aperture in said second scanning mode.

13. The bar code symbol reading device of claim 1, wherein said laser scanning engine comprises a visible laser light source, a scanning element and a plurality of stationary mirrors that cooperate to project said omni-directional scanning pattern through said light transmission aperture in said first scanning mode.

14. The bar code symbol reading device of claim 13, wherein said visible laser light source, scanning element and a predetermined subset of said plurality of stationary mirrors of the laser scanning engine cooperate to project said single line scanning pattern through said light transmission aperture in said second scanning mode.

15. The bar code symbol reading device of claim 14, further comprising control circuitry that operates, in said second scanning mode, to control power of said visible laser light produced by said laser light source.

16. The bar code symbol reading device of claim 15, wherein said control circuitry operates, in said second scanning mode, to control the duty cycle of said visible laser light to selectively enable said laser light source to produce laser light only when the light produced therefrom is directed by said scanning element onto said predetermined subset of stationary mirrors.

17. The bar code symbol reading device of claim 15, wherein said control circuitry operates, in said second scanning mode, to control power of said visible laser light such that: said laser light source produces normal power laser light when the light produced therefrom is directed by said scanning element onto said predetermined subset of stationary mirrors, and said laser light source produces significantly lower power laser light when the light produced therefrom is not directed by said scanning element onto said predetermined subset of stationary mirrors.

18. The bar code symbol reading device of claim 15, wherein said scanning element comprises a rotating light directing element having a rotation cycle and said control circuitry derives timing signals synchronized to a particular interval in the rotation cycle of said rotating light directing element wherein the rotating light directing element directs light produced from the laser light source onto said predetermined subset of stationary mirrors.

19. The bar code symbol reading device of claim 18, wherein said timing signals are derived from a position sensor integrated into a rotating portion of the rotating light directing element.

20. The bar code symbol reading device of claim 18, wherein said timing signals are derived from a position indicating optical element mounted adjacent (or near) the perimeter of one of said stationary mirrors, such that the position indicating optical element is illuminated by light produced from said laser light source when the rotating light directing element reaches a predetermined point in its rotation.

21. The bar code symbol reading device of claim 20, wherein said position indicating optical element comprises a mirror that directs illumination incident thereon to a position indicating optical detector, which generates an electrical signal whose amplitude corresponds to the intensity of light incident thereon.

22. The bar code symbol reading device of claim 20, wherein said position indicating optical element comprises a light collecting lens that is operably coupled to a light guide to direct illumination incident on the light collecting lens to a position indicating optical detector, which generates an electrical signal whose amplitude corresponds to the intensity of light incident thereon.

23. The bar code symbol reading device of claim 22, wherein said light guide comprises a fiber optic bundle.

24. The bar code symbol reading device of claim 15, wherein said control circuitry comprises a 555 timer integrated circuit configured for mono-stable operation.

25. The bar code symbol reading device of claim 1, wherein said laser scanning engine operates in a preprogrammed set of operational states wherethrough the laser scanning engine automatically passes during each bar code symbol reading operation.

26. The bar code symbol reading device of claim 25, wherein the preprogrammed set of operational states include a bar code presence detection state of operation and a bar code symbol reading state of operation.

27. The bar code symbol reading device of claim 26, wherein the preprogrammed set of operational states further include an object detection state of operation.

28. The bar code symbol reading device of claim 27, which further comprises an objection detection subsystem realized using either infrared (IR) signal transmission/receiving technology, or low-power non-visible laser beam signaling technology, for automatically detecting an object within an object detection field defined relative to said hand-supportable housing.

29. The bar code symbol reading device of claim 1, further comprising a set of color-encoded light sources provide on the exterior of said hand-supportable housing for sequentially generating a set of visually-perceptible state indication signals that visually indicate to the user the various states of operation, wherethrough said device automatically passes during each instance of automatic bar code symbol reading in accordance with the present invention.

30. The bar code symbol reading device of claim 3, wherein said device, when placed in said support stand, operates in said first scanning mode of operation as a stationary hands-free projection scanner, and wherein said device, when removed from said support stand, operates in said second scanning mode of operation as a portable hand-held scanner.

110. A multi-mode automatic laser-based bar code symbol reading device comprising:

a hand-supportable housing with a light transmission aperture, wherethrough visible light can exit and enter the hand-supportable housing; and

a laser scanning engine, disposed within the hand-supportable housing, is controlled to selectively operate in either an omni-directional scanning mode or a single line scanning mode.

111. The multi-mode laser-based bar code symbol reading device of claim 110, wherein said laser scanning engine comprises:

an omni-directional laser scanning engine employing electronic control circuitry and auxillary laser beam scan sensing apparatus so as to control the generation of laser scanning patterns during omni-directional, linear, and rastered laser scanning modes of operation.

112. The multi-mode laser-based bar code symbol reading device of claim 110, wherein said laser scanning engine comprises:

an omni-directional laser scanning engine employing a linear laser scanning engine module; and

a laser beam rastering module integrated therewith so as to control the generation of laser scanning patterns during omni-directional, linear, and rastered laser scanning modes of operation.

113. The multi-mode laser-based bar code symbol reading device of claim 110, wherein during an omni-directional scanning mode, the laser scanning engine projects an omni-directional scanning pattern through the light transmission aperture, detects and decodes bar code symbols on objects passing through the omni-directional scanning pattern, and produces symbol character data representative of decoded bar code symbols.

114. The multi-mode laser-based bar code symbol reading device of claim 110, wherein during a single-line (i.e. linear) scanning mode, the laser scanning engine projects a single line scanning pattern through the light transmission aperture and detects and decodes bar code symbols on objects passing through the single line scanning pattern, and produces symbol character data representative of decoded bar code symbols.